EMCal Module Production for 2017 prototype

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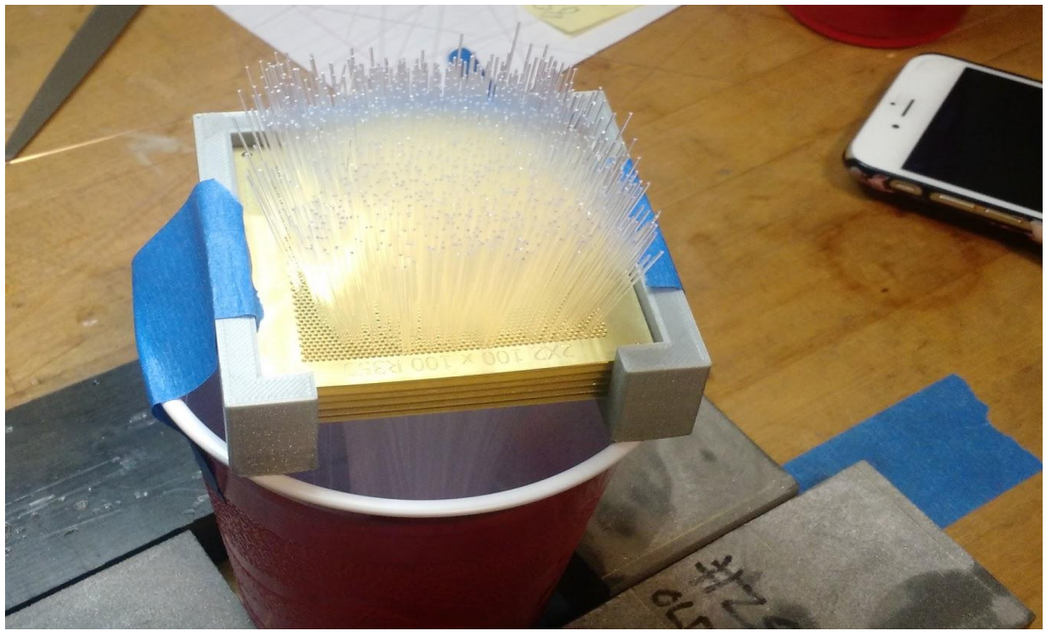
August 11, 2017

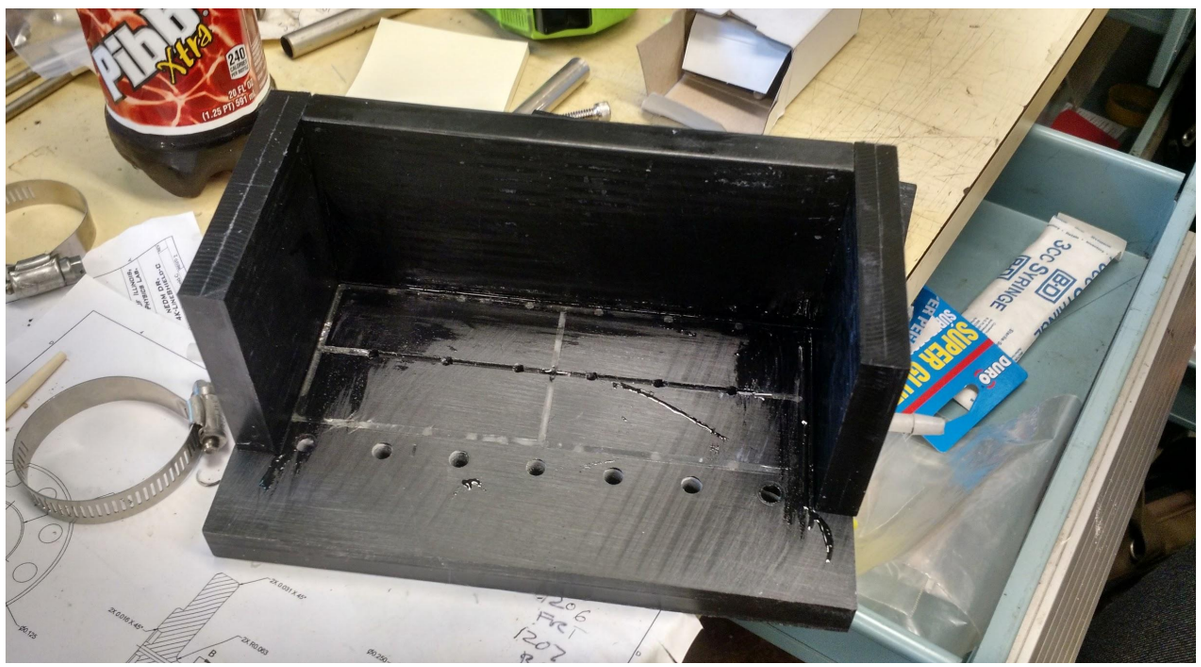


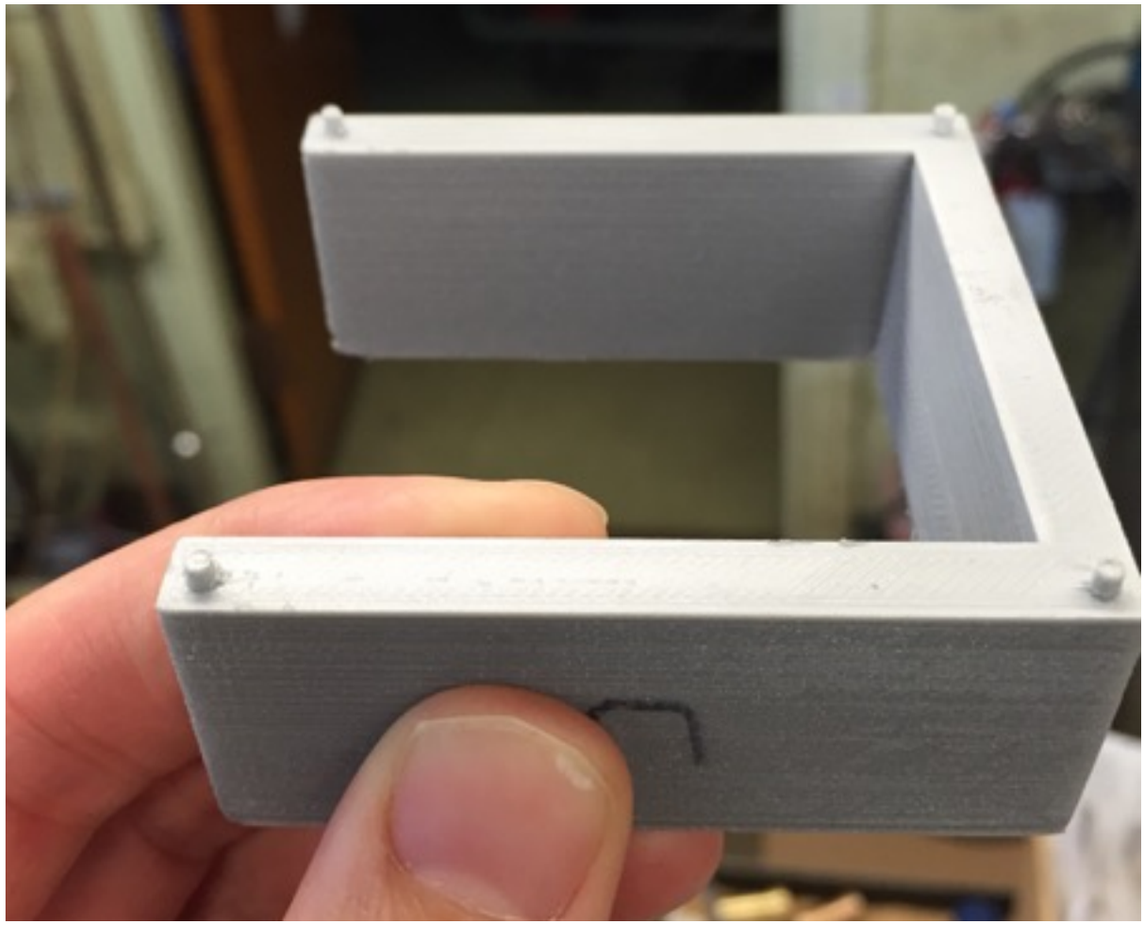
fiber filling: 3D printed frame with spacers between meshes

time to fill: 40-60 minutes
depends on experience and skill

mold for 2D projective modules

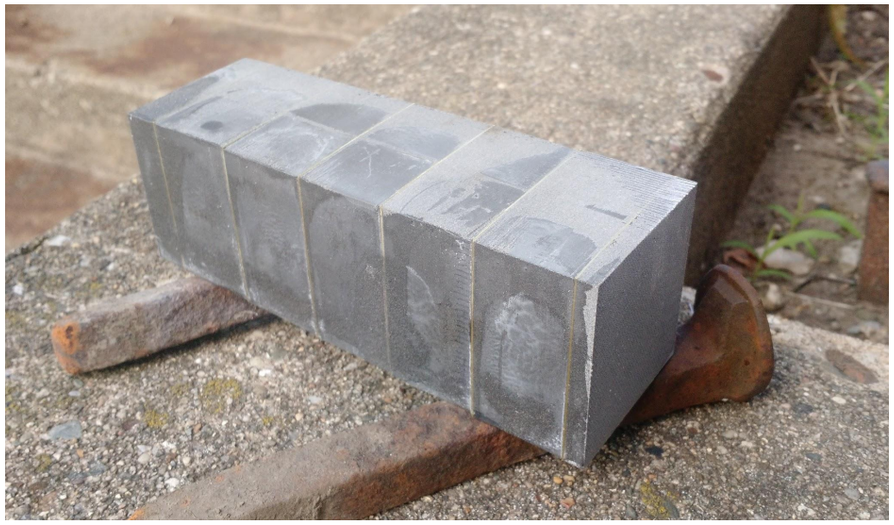
- bathtub style, partially reusable
  - base, vacuum channels provided by Delrin base
  - module shape and mesh placement provided by printed spacers

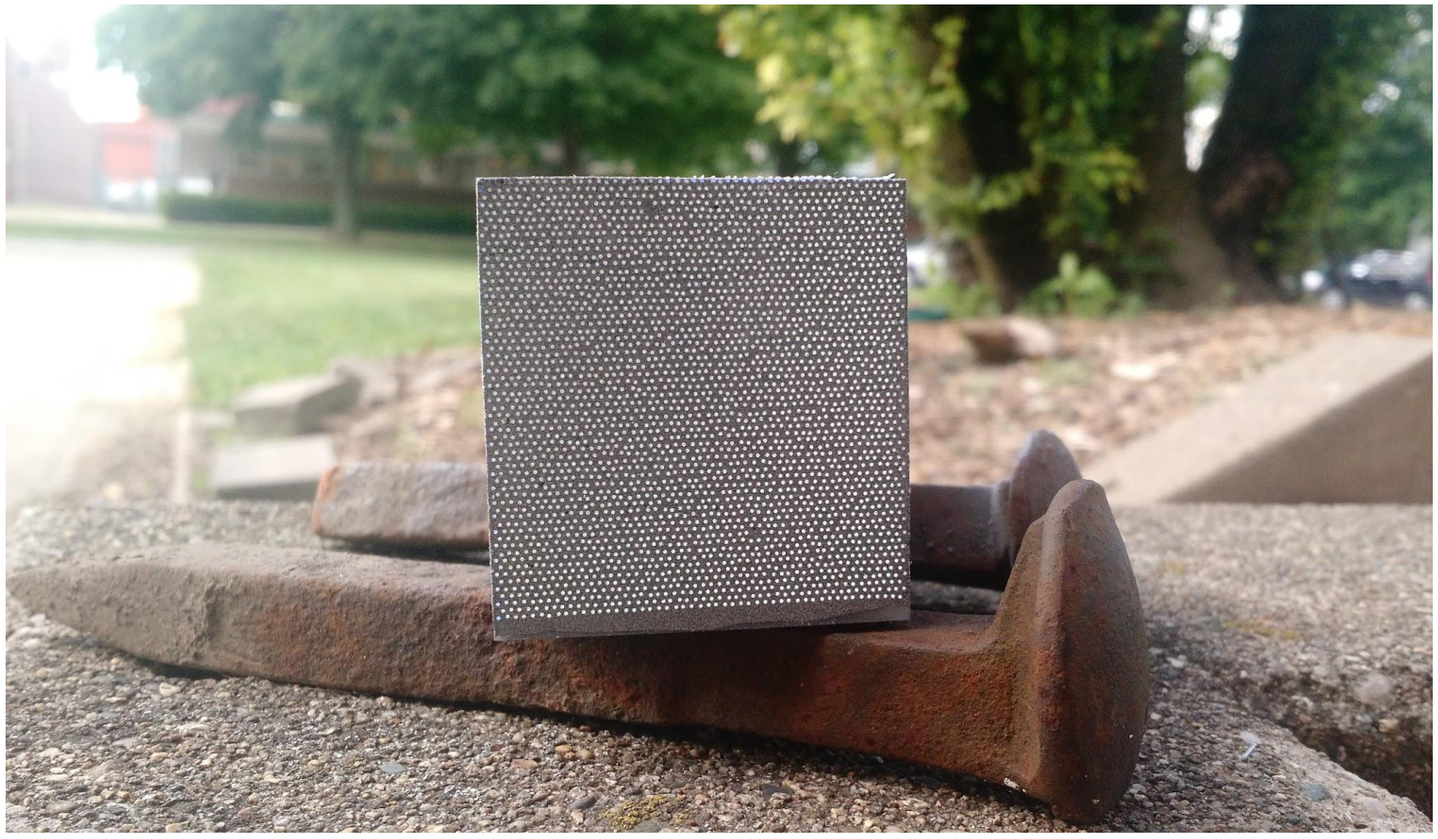




mold for 2D projective modules (2)

- fiber assembly placed in mold
- U pieces then filled in between meshes
- this design prevents the most challenging part of the 1D modules—putting the fiber assembly in the mold





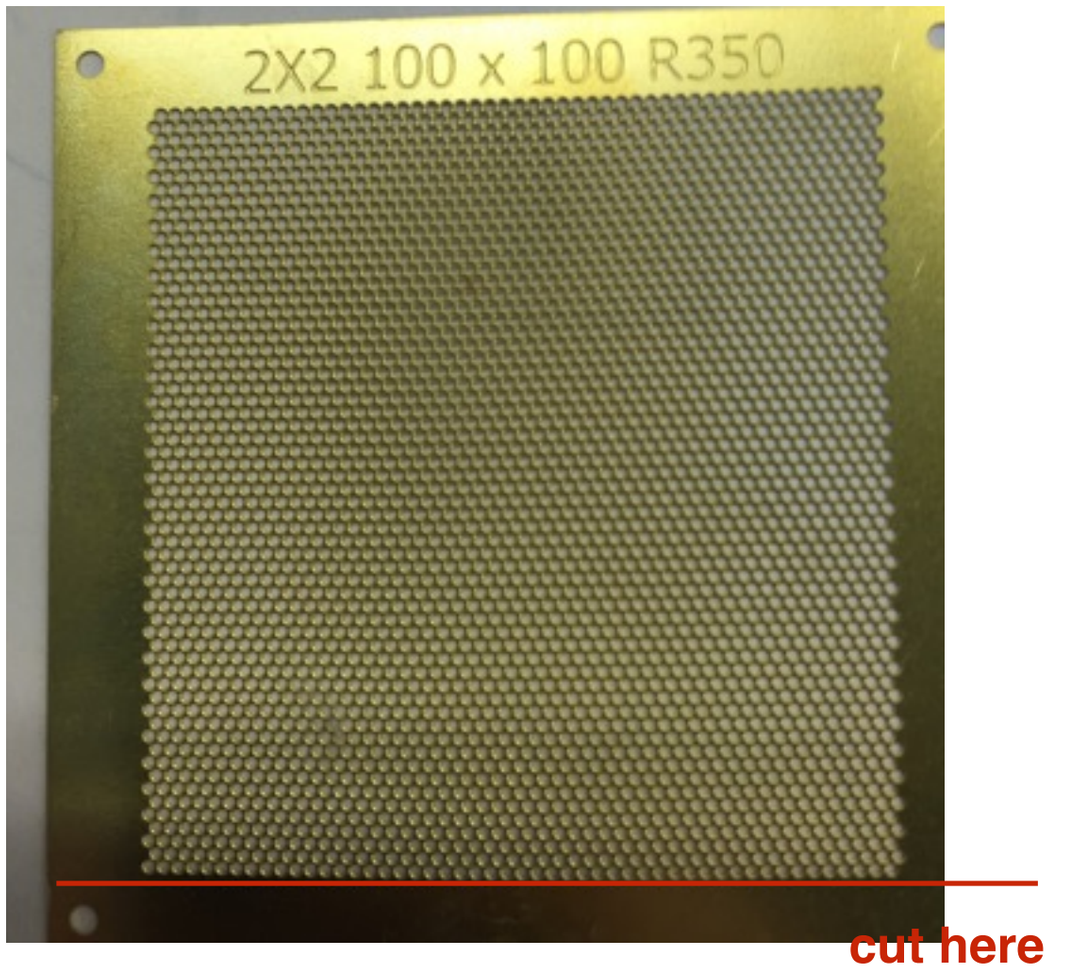
epoxy uniformity

August 10, module about to be filled

U-pieces quick epoxied into mold prior to filling

- if there are too many paths for the epoxy to follow without being uniform in the module, we will get dry spots
- main optimization now is epoxy flow

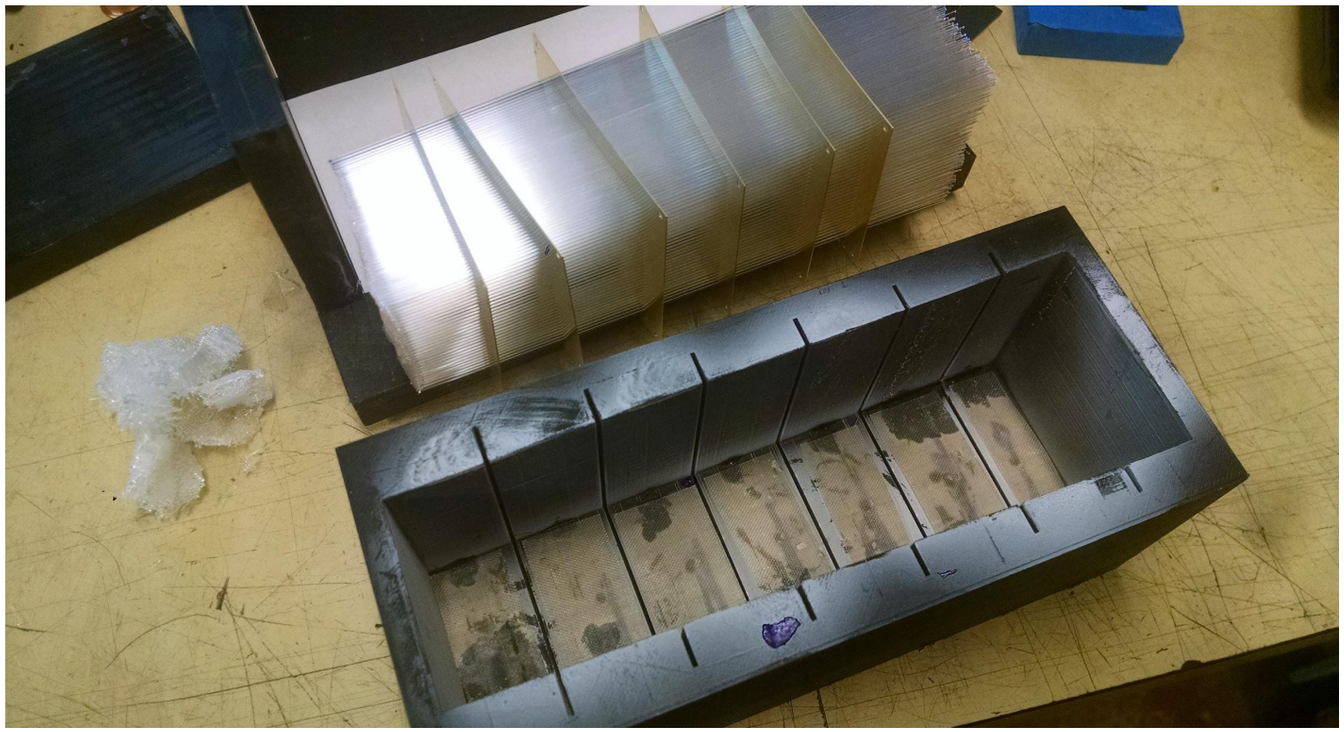
this morning!
still ~1cm dry part along the bottom, but improving



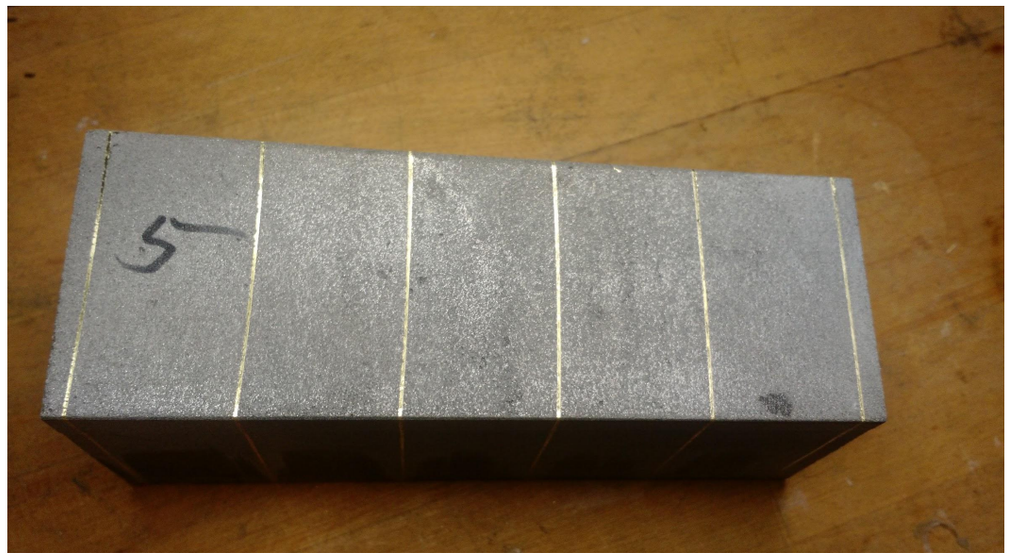
- next step: modify the meshes to remove bottom fiber free region

fully 3D printed mold

- printed mold: 80 print job
- U pieces: 2 x 7 hour print job
- U pieces provide easier and safer loading of the fibers into the mold



- both use 3D printed pieces to provide the shapes to the modules
  - issue of many different molds not relevant since these pieces are not reused



U-pieces

- 2x7 hours on the 3D printer
  - can print a total of 2 sets / day with 2 3D printers
- also looking into injection molding
  - especially for full detector
- prices seem reasonable for the quantities per size we would need

meshes

- ~1 month from ordering to delivery with the tooling already made
  - the first time we had to have the tooling made and it took about a month too…
- we should finalize the meshes and order them to have them by mid-September